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HIGHWAY SIGNS

The majority of the information required for the selection, design and placement of highway signs on Indiana highways is presented in the *Manual on Uniform Traffic Control Devices (MUTCD)* and the *INDOT Standard Drawings*. The intent of this chapter is not to reiterate the information presented in these sources but, rather, to supplement these references and, where deemed necessary, to provide the user with additional guidance.

75-1.0 MUTCD CONTEXT

Throughout the *MUTCD*, the words “shall,” “should,” and “may” are used to describe the appropriate application for various traffic control devices. The *MUTCD* defines these terms as follows:

1. Shall. A *mandatory* condition. Where certain requirements in the design or application of the device are described with the “shall” stipulation, it is mandatory when an installation is made that these requirements be met.
2. Should. An *advisory* condition. Where the word “should” is used, it is considered to be advisable usage, recommended but not mandatory.
3. May. A *permissive* condition. No requirement for design or application is intended.

The *MUTCD* shall prevail on any highway or street open to the public in which Federal funds will be or were used.

The *MUTCD* shall be used on the National Highway System regardless of the funding source.

75-2.0 GENERAL CRITERIA

Signs should only be used where they are warranted by the *MUTCD* criteria, accident history or field studies. Signs should provide information on special regulations, for hazards which are not self-evident and for highway routes, directions, destinations and points of interest. In general, all traffic control devices should meet the basic requirements as follows:

1. They should be capable of fulfilling an important need.
2. They should command attention.
3. They should convey a clear, simple meaning.
4. They should command respect of road users.
5. They should be located to give adequate time for response.
6. They must be sanctioned by law if they control or regulate traffic.

75-2.01 References

The following is the recommended list of publications for selecting, designing, constructing and installing highway signs.

1. *Manual on Uniform Traffic Control Devices*, FHWA;
2. *Traffic Control Devices Handbook*, FHWA;
3. *Standard Highway Signs*, FHWA;
4. *INDOT Standard Highway Signs*, INDOT;
5. *Standard Alphabets for Highway Signs and Pavement Markings*, FHWA;
6. *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, AASHTO;
7. *Standard Specifications*, INDOT;
8. *Traffic Engineering Handbook*, Institute of Transportation Engineers;
9. Chapter Forty-nine "Roadside Safety," *Indiana Design Manual*, INDOT; and
10. *Manual of Steel Construction*, American Institute of Steel Construction.

The INDOT publications may be obtained by contacting the Design Division's Specialty Project Group. For other publications, the indicated source should be contacted.

75-2.02 Reflectorization

It is INDOT policy that all signs should be reflectorized. They may also be illuminated. Section 75-2.03 discusses INDOT's illumination criteria. The INDOT *Standard Drawings* provide INDOT's reflectorization criteria for signs. For local facilities, reflectorization of signs will be based on the city or county preference. The following describes the common reflective sheeting types that are available:

1. Enclosed Lens. This reflective sheeting consists of spherical lens elements embedded beneath the surface of a smooth, transparent, flexible plastic resulting in a non-exposed lens, optical reflecting system. This sheeting type is commonly called engineering grade sheeting. Super-engineering grade sheeting is similar, except that it is made with higher quality materials and more spherical lens elements.
2. Encapsulated Lens. This reflective sheeting consists of spherical glass beads which are adhered to a synthetic resin and encapsulated by a flexible, transparent waterproof plastic having a smooth surface. This sheeting type is commonly called high-performance grade or high-intensity grade sheeting.
3. Prismatic Lens. High-intensity prismatic reflective sheeting is similar to encapsulated lens sheeting, except that it uses unmetallized prismatic reflectors instead of glass beads. Super-high intensity reflective sheeting is similar to high-intensity sheeting except that it uses cube-corner prismatic lens.
4. Flexible Encapsulated Lens. This retroreflective material is intended to be applied to flexible, impact-resistant plastic devices such as flexible delineators or plastic drums used as channelizing devices in work zone traffic control. It is referred to as "flexible" because it can withstand expansion and contraction and will generally not crack when hit by a vehicle or when roughly handled.

Although encapsulated and prismatic lens sheeting are generally more expensive than enclosed lens sheeting, they provide much better retroreflectivity. For permanent sign installations, only encapsulated or prismatic sheeting should be used. For additional information on reflective materials, the designer may review the publications as follows:

1. *Retroreflectivity of Roadway Signs for Adequate Visibility: A Guide*, FHWA/DF-88/001, November 1987.
2. NCHRP Report 346, *Implementation Strategies for Sign Retroreflectivity Standards*, TRB, April 1992.

3. ASTM Designation: D4956 *Standard Specification for Retroreflectivity Sheeting for Traffic Control*, latest version.

75-2.03 Illumination

Most signs are generally designed to be illuminated by vehicular headlights and the sign message reflected back to the driver. Signs may also be internally or externally illuminated by a direct source. Note that street or highway lighting does not meet the requirements for sign illumination. The following provide several INDOT guidelines for when sign illumination should be considered.

1. Overhead Signs. Lighting should be provided where background lighting obscures the legend of the sign, the sign is not adequately visible or there is nearby highway lighting. In urban areas, overhead panel signs should be illuminated. In rural areas, the need for overhead panel sign illumination will be determined on a case-by-case basis. Lighting may also be used on overhead panel signs at interchanges or intersections where the traffic volume warrants in Figure 75-2A, External Overhead Sign Lighting Guidelines, are met and where a power supply is readily available. If full interchange lighting is provided, all overhead signs should be illuminated. External lighting of overhead panel signs should be accomplished with the fixtures at the bottom of the sign. Internally lighted signs may also be used. Figure 75-2B₁, Overhead Sign Luminaires, and Figure 75-2B₂, Luminaire Horizontal Placement Dimensions for Overhead Signs, should be used to determine the number and spacing of external sign luminaires for overhead signs.

Figure 75-2A also presents night traffic volumes below which the designer may consider removing existing lighting for overhead panel signs.

2. Truck Weigh Stations. Lighting may be provided for the sign preceding a truck weigh station which indicates that the station is open or closed. This is typically accomplished with an internally lighted sign.

75-2.04 Sign Placement

The MUTCD and the *INDOT Standard Drawings* provide criteria for the placement of signs next to and/or over the roadway. These sources also provide criteria for the maximum and minimum allowable sign heights.

As a general rule, warning signs are normally placed in advance of the conditions to which they call attention. Regulatory signs are placed where their mandate or prohibition applies or begins. Guide signs are placed at varying locations to inform drivers of their route of travel, destination and points of interest.

The uniform position of signs, although desirable, is not always practical to achieve because the alignment and design of the road often dictates the most advantageous position for the sign. When determining the sign location, the designer should review the guidelines as follows:

1. Signs should be placed on the right side. Under some circumstances, signs may be placed on channelizing islands or overhead or, where there are short sharp curves to the right, they may be placed on the left side directly in front of the driver.
2. Dual-mounted signs may be considered for additional emphasis where it is anticipated that a single sign may not provide adequate warning, such as at intersections just beyond sharp horizontal curves or at locations where drivers may be required to make an unexpected maneuver.
3. Sign placement and the roadway geometric design should be coordinated as early as practical during the project planning and design stages. If a roadway design does not permit adequate placement of the required signs, the geometric design may need to be revised accordingly. It should also be noted that an improper geometric design cannot always be corrected by signing.
4. Where lane control is desired, signs should be placed directly over the affected lane.
5. Signs should be located to optimize nighttime visibility.
6. Adherence to the criteria presented in the *MUTCD* and *INDOT Standard Drawings* is not always practical; actual sign placement may be adjusted to meet field conditions. The following lists several placement problem areas that should be avoided:
 - a. at short dips in the roadway,
 - b. beyond the crest of a vertical curve,
 - c. where a sign may be obscured by parked cars,
 - d. where a sign would create an obstruction for pedestrians or bicyclists,

- e. where a sign would interfere with the driver's visibility to hazardous locations or objects,
 - f. where sign visibility would be impaired due to existing overhead illumination,
 - g. where a sign is vulnerable to roadside splatter or to being covered with snow by plowing operations, and/or
 - h. too close to trees or other foliage that could cover the sign face now or in the future.
- 7. In some cases, signs can be shifted longitudinally without compromising their intended purpose. This may improve their visibility, avoid blocking other signs, enhance safety or enhance traffic operations (e.g., by providing more distance between signs in a series).
 - 8. Signs should generally be erected individually on separate posts or mountings. However, it may be appropriate to group the signs (e.g., route markings) with consideration for wind loading and breakaway characteristics.
 - 9. The INDOT *Standard Drawings* provide criteria for the lateral clearance of roadway signing. In addition, the designer should review Section 75-2.05.
 - 10. All wide-flange post installations should include a perforated fuse plate as well as a perforated hinge plate. A note on the plan sheet and wide-flange sign summary sheet should also be shown, so that the contractor will install the structure accordingly.

75-2.05 Roadside Safety

Chapter Forty-nine presents the Department's criteria for clear zones, roadside barriers, impact attenuators and other roadside safety issues. These are also applicable to roadside signs. In addition, the designer should consider the following:

- 1. Ground-Mounted Sign Supports. In general, all supports for ground-mounted signs should be made breakaway or yielding, including those outside of the clear zone. New sign supports behind guardrail should have adequate clearance to the back of the guardrail post to provide for the guardrail dynamic deflection (see Section 49-4.0).
- 2. Overhead Sign Supports. All overhead signs will use non-breakaway supports. Within the clear zone, these structures must be protected with guardrail or, where applicable, with an impact attenuator. In medians, these types of sign supports should be protected as follows:

- a. If the distance between the sign support and the edge of the travel lane or auxiliary lane is 7.6 m or less, an impact attenuator should be used.
- b. If the distance between the sign support and the edge of the travel lane or auxiliary lane is greater than 7.6 m, a gravel barrel array should be used.

See Section 49-6.0 for additional information on the design and layout of impact attenuators.

3. Ground-Mounted Panel Signs. Large signs (over 4.5 m² in area) on slipbase breakaway supports should not be placed in areas where the opportunity exists for them to be struck more than 230 mm above the normal point of vehicular bumper impact. Normal bumper height is 460 mm. To avoid signs being struck at an improper height, they should be placed as follows:
 - a. Fill Slopes Flatter than 4:1. Signs should be located a minimum of 9.0 m from the edge of the travel lane to the nearest edge of the sign.
 - b. Fill Slopes 4:1 or Steeper. The nearest sign edge should be located 1.8 m from the edge of shoulder or 3.6 m from the edge of the travel lane, whichever is greater.
4. Roadside Appurtenances. Large breakaway sign supports should not be located in or near the flow line of ditches. If these supports are placed on a backslope, they should be offset at least 1.0 m from the toe of the backslope of the ditch.
5. Exit Gore Signs. Exit gore signs should be placed in all gore areas on the Interstate systems as shown on Figure 75-2C, Sign Gore Treatment.

75-2.06 Overhead Signs

The following provides several guidelines to consider in whether to use overhead or ground-mounted panel signs.

1. Lane Control. Overhead signs should be considered where the message is applicable to a specific lane(s). If the sign is placed over the lane, lane use can be made significantly more effective, especially where additional guidance is required for unfamiliar drivers.

2. Visibility. Overhead signs should be considered where traffic or roadway conditions are such that an overhead mounting is necessary for adequate visibility (e.g., vertical or horizontal curves, closely spaced interchanges, three or more through lanes in one direction).
3. Divergent Roadways. Overhead signs should be considered, at, or just in advance of, a divergence from a heavily traveled roadway (e.g., at a ramp exit where the roadway becomes wider and a sign on the right side is usually not in the line of sight for the driver).
4. Exits. Overhead panel signs should be considered where left-hand or multi-lane exit ramps are used.
5. Interchanges. Overhead panel signs should be considered at complex interchanges where there may be some driver confusion, where there are closely spaced interchanges, Interstate-to-Interstate interchanges, and/or where there are lane drops on the exit ramp or mainline within the interchange.
6. Trucks. Overhead signs should be used where there are significant numbers of large trucks which may block the driver's visibility to ground-mounted signs.
7. Limited Right of Way. Overhead panel signs should be considered where there is limited space for signs on the roadside (e.g., where right-of-way is narrow).
8. Roadside Development. Overhead signs should be considered at locations where roadside development seriously detracts from the effectiveness of roadside signs (e.g., brightly lighted areas).
9. Uniformity. Overhead signs may be used to be consistent with other signs on a given section of highway.

New installations of overhead signs will require a minimum vertical clearance of 5.35 m above the roadway and shoulders but not greater than 5.50 m. This includes an additional 150-mm clearance for a future overlay. Existing overhead signs may have a vertical clearance of 5.20 m.

Where sign lighting is used, overhead signs should not be placed on bridge overpasses. Non-lighted signs may be placed on overcrossing structures provided that the vertical clearance of the sign exceeds the vertical clearance of the overcrossing structure by at least 150 mm.

75-2.07 Sign Priority

Overloading motorists with too much information may cause improper driving and impair safety. Therefore, some sign information may need to be removed, replaced or relocated. Where sign overloading may be a problem, the following lists the recommended priority for sign types.

1. regulatory signs (e.g., speed limit, stop signs, turn prohibitions);
2. warning signs (e.g., curve sign, cross road sign, narrow bridge sign);
3. guide signs (e.g., destination signs);
4. emergency services signs (e.g., hospital, telephone);
5. motorist service signs (e.g., fuel, food, camping);
6. public transportation signs (e.g., park and ride, bus stops);
7. traffic generator signs (e.g., museums, ball parks, historic buildings); and
8. general information signs (e.g., county lines, city limits).

Within the various sign groups, the sign bearing the most important message should supersede the others.

75-2.08 Computer Software

There are many computer software programs available to the designer that may be used in the design of highway signing including sign layouts, legends, quantities, structural supports, etc. The designer should be aware that not all software packages are applicable to Indiana. Therefore, the user should first contact the Design Division's Specialty Project Group, traffic sign / lighting engineer to determine which programs and versions are acceptable for use on INDOT projects. The following is a brief summary of the programs currently acceptable to the Department.

1. SignCAD 2000. This program helps the designer determine the appropriate panel size for guide signs along freeways. The program was developed by Berg and Effrem, Inc.
2. GuidSIGN. This program provides the designer with standardized guide sign layouts, text fonts, letter spacing, and sign sizes. The program was developed by Transoft Solutions.

Addresses or contacts for the software companies listed above may be obtained from the Design Division's Specialty Project Group, traffic sign / lighting engineer.

75-2.09 Symbology

Where the *MUTCD* permits the use of either words or symbols on the sign, INDOT's preferred

practice is to use only the symbol message.

75-2.10 Structural Design

The INDOT *Sign Design Guide* provides the Department's criteria for foundation design, sign structure design, I-beam post selection, etc. Copies of this publication can be obtained from the Design Division's Specialty Project Group.

75-2.11 Applications

In general, all placement and usage of signs should follow the criteria presented in the *MUTCD* and *INDOT Standard Drawings*. The use of experimental traffic control devices is acceptable provided their approval is in accordance with the criteria presented in the *MUTCD*. Figure 75-2D provides guidelines for general usage of the various sign types. The following sections on regulatory, warning and guide signs provide additional guidance or supplementary information for several specific signs. For all signs, including those in the following sections, the references in Section 75-2.01 should be reviewed to determine the appropriate sign application.

75-3.0 REGULATORY SIGNS

75-3.01 Official Action

An "official action" will be required whenever there is a proposed change in the regulatory nature of a sign or situation affecting a facility. For example, an "official action" is required where changes are made to the intersection control, parking restrictions, no-passing zones, traffic signals or certain work site speed zones (e.g., installing a stop sign at an existing uncontrolled intersection). On State-controlled facilities, the designer must obtain an approval for the proposed change from the appropriate district traffic engineer prior to implementation of the change. For local facilities, approval must be obtained from the appropriate jurisdiction prior to implementation.

75-3.02 Stop/Yield Signs

75-3.02(01) General

“Stop” signs should be installed at all at-grade, non-signalized local roads/streets which intersect a State-maintained highway. A “Yield” sign may be used if the intersection is operating in a merge condition (e.g., channelized intersection with a turning roadway) or at an entrance ramp to an access-controlled facility.

For local facilities, the warrants provided in the *MUTCD* should be followed. For additional information, the following publications may be reviewed to determine the need for a “Stop” or “Yield” sign.

1. *Stop, Yield, and No Control at Intersections*, Report No. FHWA/RD-81/084, FHWA, June 1981; and
2. NCHRP 320, *Guidelines for Converting Stop to Yield Control at Intersections*, TRB, October 1989.

75-3.02(02) Multiway Stops

The *MUTCD* presents the warrants for where multiway-stop installations may be considered. However, they should not be used unless the traffic volumes for each approach leg of the intersection are approximately equal. A traffic signal is the preferred traffic control device for intersections with heavy volumes of traffic.

Multiway stop controls are frequently used in residential areas. The following presents several guidelines for the installation of multiway stop controls in residential areas.

1. Collector Streets. At the intersection of two collector streets that are primary to the area.
2. Four-way Intersections. Where there is a 60-40 percent (or closer) volume split for a four-way intersection.
3. Three-way Intersections. Where there is a 75-25 percent (or closer) volume split for a three-way intersection.
4. Accidents. Where there are three or more accidents in one year which may be corrected by a multiway stop sign.

75-3.02(03) Stop Signs at Railroad Crossings

“Stop” signs may be used at highway-rail crossings for crossings that have two or more trains per day and are without automatic traffic control devices. For other crossings with passive protection, “Stop” signs may be used after a need has been established by a traffic engineering study. The study should consider such factors as: volume and character of highway and train traffic, adequacy of stopping sight distance, crossing accident history and need for active control devices. Where “Stop” signs are installed, a “Stop Ahead” advance warning sign should also be installed.

75-3.03 Speed Limit Signs

The district traffic engineer is responsible for determining speed limits on State facilities, and all requests must be transmitted to the appropriate district office. For local facilities, each local jurisdiction is responsible for determining the appropriate speed limit within their boundaries. This typically occurs after a speed study has been conducted. When determining the posted speed limit on either the State or local system, the following factors should be considered.

1. the 85th-percentile speed;
2. the design speed used during project design;
3. the road surface characteristics, shoulder condition, grade, alignment and sight distance;
4. functional classification and type of area;
5. type and density of roadside development;
6. the accident experience during the previous 12 months;
7. parking practices and pedestrian activity; and
8. the maximum or minimum legal speed limit permitted by the Indiana Statutes.

The *MUTCD* indicates the elements that should be reviewed in an engineering study. The ITE *Manual of Traffic Engineering Studies* provides guidance on how to conduct a speed study. All public roads in Indiana are controlled by regulatory speed limits, either through posted speed limit signs or with legal speed limits contained in the Indiana Statutes. Section 40-3.02(03) presents the maximum and minimum legal speed limits for rural and urban areas and for State and non-State facilities.

75-3.04 No U-Turn Signs

On freeways, the No U Turn sign should be used at all median crossovers. This sign should be placed at the far side of the median crossover for oncoming traffic.

75-3.05 Lane-Use Control Signs at Intersections

The Department's practice is to use overhead lane-use control signs at major urban intersections where left- and right-turn lanes are provided or where there is the possibility of confusion at the intersection.

75-3.06 Right-Turn Only Signs

When an exclusive right-turn only lane is provided, the use of an overhead sign should be considered where background clutter may be a problem. If background clutter is not a problem, ground-mounted signs may be as visible and more cost effective.

75-3.07 Two-Way Left-Turn Only (TWLTO) Signs

Overhead lane control signs should be provided at the beginning and end of the two-way, left-turn lanes and in urban areas approximately every 300 m in between. In suburban and built-up rural areas, the intermediate TWLTO sign spacing may be increased but normally not greater than 400 m. For the beginning and end, the supplementary "Begin" and "End" plates should also be included. TWLTO signs should also be used on the back side of a "Left Turn Only" sign where a two-way, left-turn lane is transitioned into a one-way, left-turn lane. The supplementary "Begin" and "End" plates are typically not included for this situation. Section 76-2.05(02) illustrates the pavement markings used for this transition.

The Department's preferred practice is to mount the overhead signs on cantilever supports, if feasible; if not, cable supports may be used. Supplemental post-mounted signs are not necessary.

75-3.08 Do Not Pass Signs

The beginning of the no-passing zone is normally marked with a "No Passing Zone" sign on the left side of the roadway. The end of the zone is normally indicated with a sign post with three white delineators attached which is installed on the right side of the roadway. No-passing signs are not required at those zones marked because of railroad crossings, or at most intersections or in urbanized areas.

75-3.09 Parking Signs

The Department's preferred practice, wherever practical, is to use the generic "No Parking" sign on all State facilities. Where necessary, other no parking signs and messages may be used as shown in the MUTCD.

75-3.10 No-Turn-On-Red Signs

Unless otherwise signed, right-turn-on-red is allowed at all intersections within the State. Where two one-way streets intersect, left-turn-on-red is allowed unless otherwise signed. After conducting an engineering study as defined in the *MUTCD*, the designer will submit a recommendation on the need for eliminating turn-on-red movements to the district traffic engineer or to the appropriate local jurisdiction. The district traffic engineer or local jurisdiction will have final approval for any turn-on-red restrictions. Once the decision has been made to eliminate the turning movement, the proper no-turn-on-red sign will be used as specified in the *MUTCD*.

75-4.0 WARNING SIGNS

Warning signs are used where it is deemed necessary to warn drivers of existing or potentially hazardous conditions on or adjacent to a highway or street. Warning signs must be located in advance of the conditions to which they apply. The use of warning signs should be kept to a minimum. Over use of warning signs at obvious hazardous locations tends to cause non-compliance for all signs. The following sections provide additional guidance for the placement of warning signs.

75-4.01 Placement of Advance Warning Signs

Figure 75-4A, Suggested Minimum Distances for Placement of Advance Warning Signs, provides the suggested minimum distances for preliminary placement of advance warning signs. The final location for warning signs will be determined during the field check in conjunction with INDOT or local agency personnel. The distances in Figure 75-4A are based on three conditions which are defined by the *MUTCD* as follows:

1. Condition A. A high driver judgment condition which requires the driver to use extra time in making and executing a decision because of a complex driving situation.

2. Condition B. A condition in which the driver will likely be required to stop.
3. Condition C. A condition in which the driver will likely be required to decelerate to a specific speed.

If these distances cannot be met, then other measures should be considered to attract the motorist's attention to the sign. These additional measures will be determined on a case-by-case basis.

For those warning signs typically used by the Department, Figure 75-4B indicates which of the three Conditions will most likely apply. The following examples illustrate how to use Figures 75-4A and 75-4B, Conditions for Placement of Advance Warning Signs.

* * * * *

Example 75-4.1

Given: Stop-controlled intersection
Posted Speed (on stop-controlled leg) - 80 km/h

Problem: Where to place a "Stop Ahead" sign

Solution: From Figure 75-4B it is determined that the "Stop Ahead" sign is a Condition B category (i.e., the driver must stop). From Figure 75-4A, the set-back distance from the "Stop" sign should be 115 m.

If the sign cannot be adequately placed at a location of approximately 115 m, then other measures may be required to provide additional emphasis to the warning sign.

Example 75-4.2

Given: A 70 km/h horizontal curve
Posted Speed - 90 km/h (55 mph)

Problem: Where to place a Curve Ahead symbol sign

Solution: From Figure 75-4B it is determined that the Curve Ahead symbol sign is a Condition C category (i.e., the driver must slow down from 90 km/h to 70 km/h). From Figure 75-4A, the minimum set-back distance from the horizontal curve PC is shown to be 55 m.

An Advisory Speed “45 MPH” plate indicating that the maximum recommended speed of the curve is 70 km/h should also be used.

* * * * *

75-4.02 Turn/Curve Signs

The *MUTCD* shows several horizontal alignment signs, but it does not fully identify when to use these signs. The decision on using an advance turn or curve warning sign is dependent upon many factors including posted speed, alignment, accident history, etc. It would be impractical and uneconomical to place an advance warning sign at every horizontal curve. Before using an advance turn or curve warning sign, the designer should consider the following:

1. Speed Determinations. In determining whether or not to place an alignment warning sign and advisory speed plate, the designer first needs to determine the appropriate speed of the curve. If the curve radius and superelevation are known (e.g., from construction plans), then the appropriate speed of the curve can be calculated (see Section 43-2.0). If the radius of the curve is unknown, then a field study is usually warranted. These types of studies are typically done using a ball-bank indicator.

The ball-bank indicator test involves driving a test vehicle around a curve at various speeds and reading a curved level to determine an appropriate speed for the curve. Figure 75-4C, Ball-Bank Indicator Readings, presents the various maximum recommended speeds for a curve based on several ball-bank readings. Test runs should be conducted in both directions.

2. Highway Alignment. The designer should review the overall highway alignment to determine if warning signs are warranted. Unexpected curves after long tangent sections are likely candidates for placement of an advance warning sign. Conversely, curves on winding highways may not warrant the use of an advance warning sign because the driver will be expecting the turn. Under all circumstances, Curve Ahead symbol signs should be provided where the vertical alignment obstructs the driver’s vision of the horizontal curvature.
3. Posted Speeds. Relative to the posted speed, the designer should consider the following:
 - a. Highways with a posted or statutory speed limit of less than 50 km/h generally will not warrant an advance warning sign.

- b. A Turn Ahead symbol or Curve Ahead symbol sign should be considered when the maximum recommended speed of the curve is found to be more than 20 km/h below the posted speed.
4. Accident History. The accident history should be reviewed to determine if there is a disproportionate number of run-off-the-road accidents that can be attributed to the horizontal curve. High-accident locations will most likely warrant advance warning signs, Advisory Speed plates and/or Chevron symbol signs.
5. Driver Familiarity. Highways serving local needs (e.g., collectors, local roads) will rarely warrant advance warning signs because the typical driver will be aware of the restrictive alignment. However, on arterials and recreational roads the typical driver may be less familiar with the highway and may require additional warnings.
6. Area Classifications. Urban areas will typically not warrant the use of advance warning signs because speeds tend to be lower and there is greater driver familiarity and awareness.
7. Public Reaction. Local residents generally have some indication of how drivers are reacting to the horizontal curve. If there are no complaints relative to near misses or accidents, the curve will probably not warrant the need for signing. Frequent complaints usually warrant further investigation.
8. Turn Ahead Versus Curve Ahead Symbol Sign. If it is determined that an advance alignment warning sign is warranted, the *MUTCD* recommends that a Turn Ahead symbol sign be used if the curve's maximum recommended speed is 50 km/h or less and that a Curve Ahead symbol sign be used if the curve's maximum recommended speed is greater than 50 km/h.
9. Advisory Speed Plates. If a Turn Ahead symbol sign is used, an Advisory Speed plate should also be used presenting the maximum recommended speed. For Curve Ahead symbol signs, an Advisory Speed plate should be used when the recommended speed of the curve is more than 20 km/h below the posted speed. Typically, no Advisory Speed plate is required where the curve speed is equal to or greater than the posted or statutory speed limit.
10. Combination Curves. A combination curve consists of two or more successive curves. They may be connected with or without short tangent sections, and they may be in the same or in opposite directions. If either of the curves requires a Turn Ahead or Curve Ahead symbol sign, a Reverse Curve symbol sign should be used. For three or more successive curves, the Winding Road symbol sign should be used. If an Advisory Speed plate is necessary, the lowest recommended speed of all the curves should be used on the plate.

75-4.03 Chevron Symbol Signs

Chevron symbol signs should be used where there is a history of run-off-the-road accidents in conjunction with a horizontal curve. The Department's practice is to install at least three Chevron symbol signs. The *MUTCD* provides the criteria for placement of such signs.

75-4.04 Signal Ahead Symbol Sign

The need for the Signal Ahead symbol sign will be determined case-by-case based on the accident history and any sight distance restrictions. Typical locations for Signal Ahead symbol signs include isolated signalized intersections or in advance of the first intersection in a series of signalized intersections. They are typically not used in urban areas with multiple signalized intersections.

75-4.05 Advisory Exit Speed Signs

Advisory Exit Speed signs should be used at all freeway exit ramp gores where the ramp design speed is less than the mainline design speed. The "Exit ____ MPH" sign may be used on freeway ramps. If the ramp connects two freeways, the "Ramp ____ MPH" sign should be used.

75-4.06 Advance Street/Road Name Signs

An Advance Street/Road Name sign may be provided before major street crossings. On State facilities, signs are usually not provided for minor street crossings. This supplementary sign is used in conjunction with the Cross Road, Side Road, or Signal Ahead symbol signs.

75-5.0 GUIDE SIGNS

The *MUTCD* provides the criteria for the placement and design of guide signs along Indiana highways. In addition, the following sections provide supplemental information relative to guide signs.

75-5.01 Distance Signs

Distance signs can have either two or three destination points and the distance to these destinations. Destination points should be arranged on the Distance sign as follows:

1. **Top Line.** The top line should identify the name and distance of the next meaningful community, route number or intersecting highway on which the traveler's route passes.
2. **Middle Line.** The middle line, if used, should contain the name and distance of communities or major route numbers that are beyond the destinations listed in the top line and are of general interest to the traveler. Figure 75-5A provides a list of the regional control cities for use on distance signs along Indiana's Interstate system. Regional control cities are the intermediate cities between the major control cities that are located within the State's boundaries.
3. **Bottom Line.** The bottom line of distance signs should contain the name and distance of the next national control city. Figure 75-5B provides a list of the major control cities for use on distance signs along Indiana's Interstate system. National control cities are those cities which have national significance for the through traveler.

75-5.02 Logo Signing

Logo signs are specific informational panels that have a separately attached sign consisting of a single or multicolored symbolic design unique to a product, business or service facility. They are used to identify traveler services that are available on a crossroad at or near an interchange or an intersection. Information on INDOT's logo signing policy can be found in the Indiana Statutes and by contacting the Operations Support Division. These signs are placed and maintained through a private contract with INDOT. However, Logo signs are a part of the INDOT signing system. They may be relocated or temporarily removed as deemed necessary by the Department's construction contractor. The *MUTCD* should be used in the design, layout and placement of Logo signs.

75-5.03 Supplemental Guide Signs

Figure 75-5C presents the Department's general guidelines for determining the eligibility of traffic generators (cities, attractions, other major traffic generators) to place permanent tourist-oriented directional signs or other supplemental information guide signs along State-maintained highways. When requested to install new signage or for more information on the Department's supplemental

guide sign policy, the user should contact the Operations Support Division and/or the district traffic engineer.

75-5.04 Guide Signs for Interchange Crossroads

The design and layout criteria for Advance Exits and Directional signs on freeways are clearly defined and shown in the *MUTCD*. Figures 75-5D through 75-5Q illustrate INDOT's preferred practice for the placement of Directional signs along the crossroad approaching an interchange. Figure 75-5D presents the guidelines for which sign layout plans shown in Figures 75-5E through 75-5Q should be used for the various interchanges and crossroad types. The figures and the titles are listed below.

75-5D	Typical Crossroad Signing at Freeway Interchanges
75-5E	Diamond Interchange Signing (Major Crossroad Over)
75-5F	Diamond Interchange Signing (Major Crossover Under)
75-5G	Diamond Interchange Signing (Minor Crossroad Over)
75-5H	Diamond Interchange Signing (Minor Crossover Under)
75-5 I	Full Cloverleaf Interchange Signing (Major Crossroad Over)
75-5J	Full Cloverleaf Interchange Signing (Major Crossover Under)
75-5K	Full Cloverleaf Interchange Signing (Minor Crossroad Over)
75-5L	Full Cloverleaf Interchange Signing (Minor Crossover Under)
75-5M	Partial Cloverleaf Interchange Signing (Major Crossroad Over)
75-5N	Partial Cloverleaf Interchange Signing (Major Crossover Under)
75-5 O	Partial Cloverleaf Interchange Signing (Minor Crossroad Over)
75-5P	Partial Cloverleaf Interchange Signing (Minor Crossover Under)
75-5Q	Trumpet Interchange Signing

75-5.05 Street Name Signs

Street Name signs are very helpful to motorists and should be legible a sufficient distance in advance of the cross street to allow the motorist to perceive and react in time to make the desired maneuver in a safe manner. In order to provide adequate sign visibility, sign letter heights should be as follows:

1. Ground-Mounted Signs.
 - a. Posted speed limit \geq 30 mph, Upper case letters 150 mm (6 in.) Series C or D,
Lower case letters 110 mm (4½ in.)
Series C or D.

- b. Posted speed limit ≤ 25 mph, Upper case letters 100 mm (4 in.) Series C or D.

2. Overhead Signs.

- a. Upper case letters 200 mm (8 in.) Series EM.
- b. Lower case letters 150 mm (6 in.) Series EM.